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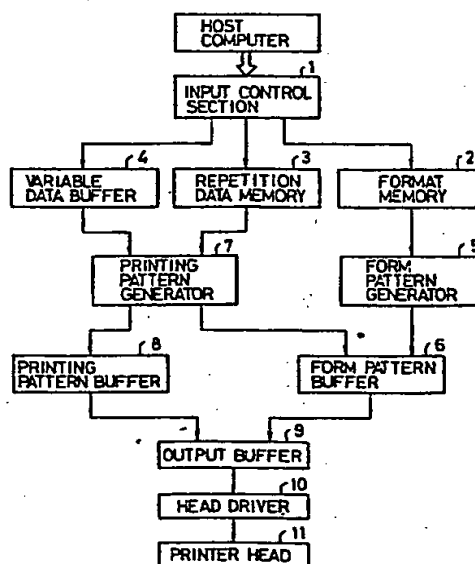
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(54) Form overlay type printing apparatus.

(57) A form overlay type document printing apparatus includes a format memory (2) for storing form data, a repetition data memory (3) for storing common data to be printed on successive documents, and a variable data buffer (4) for storing data which is unique to such document. A printing pattern generator (7) converts the repetition data and unique data to corresponding printing signals and a form pattern generator (5) generates printing signals for reproducing a selected form. The printing signals corresponding to the form data and the repetition data are combined and repetitively supplied to an output buffer (9) as long as there is no change in the form or the repetition data. The printing signals corresponding to the unique data are also supplied to the output buffer (9). The contents of the output buffer (9) are supplied to a head driver (10) which controls a printing head (11) to generate the desired printed output. In this manner, only the unique data and data arising from a change in the form or the repetition data need be transmitted from a host computer to the printing apparatus.

FIG. 1



FORM OVERLAY TYPE PRINTING APPARATUS

5 The present invention relates to a form overlay type document printing apparatus, in which blank paper, on which no form has been previously printed, is used and a form is printed on the paper together with characters by using a dot printer.

10 A form overlay type document printing apparatus is described in each of Japanese Patent Applications No.110143/81, and 71081/82. The printing apparatus disclosed in each of these laid-open application includes a printing data buffer and a form buffer and is advantageous in that when the same data are repeatedly printed, if form data has been transmitted once from a host computer and stored in the form buffer it is sufficient thereafter to
15 transmit only printing data until the form is changed. That is, it is not necessary to transmit a combination of printing data and form data from the computer every time. Also, a printing pattern and a form pattern can be generated in the printing
20 apparatus by transmitting simple codes only. This simplifies the processing at the host computer side and reduces the amount of data that must be transmitted.

25 In the prior art, however, there is a problem that in the case where a document comprising a number of sheets is to be produced with the same form and with some data which varies with every sheet and some data which is common to every sheet. This situation requires the combination of the varying or
30 unique data and the common data to be transmitted for

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every sheet from the computer. As a result the time required for data transmission is prolonged and the efficiency of the transmission line is reduced.

5 An object of the present invention is an efficient and simple form overlay-type document printing apparatus.

Another object of the present invention is the reduction of duplicate data transmitted over a transmission line in connection with a form overlay
10 type document printing apparatus.

Still another object of the present invention is to eliminate the multiple transmission of data which is common to a plurality of forms to be printed by a form overlay type document printing
15 apparatus.

These and other objects are achieved by a form overlay type document printing apparatus comprising a printing data memory for storing variable printing data which is unique to each
20 document to be printed and repetition printing data which is common to each document within a first succession of documents to be printed, a format data memory for storing format printing data defining a form to be printed on each document within a second
25 succession of documents to be printed where the second succession of documents includes the first succession of documents, means for combining the format printing data, the repetition printing data, and the variable printing data to produce print
30 control signals corresponding to the format data, the repetition data, and the variable data for each document to be printed, means for producing printed

documents corresponding to the print control signals, and means for transferring to the printing data memory the variable printing data prior to the printing of each document and the repetition printing data prior to the printing of the first document in the first succession of documents and to the format data memory the format printing data prior to the printing of the first document in the second succession of documents.

10 These and other objects, features, and advantages of the invention, as well as the invention itself, will become more apparent to those skilled in the art when considered in the light of the accompanying drawings wherein

15 Figure 1 is a block diagram of an embodiment of the form overlay type document printing apparatus of the present invention; and

 Figure 2 is an explanatory diagram of the operation of the apparatus of Figure 1.

20 Figure 1 is a block diagram showing an embodiment of the printing apparatus according to the present invention. A transfer signal (Figure 2) inputted into a printing apparatus from a host computer is classified into format designating data
25 F1, F2..., repetition data R1, R2... which do not change over plural pages, and printing data X1, X2... which change with every page or document, as shown in Figure 2.

 An input control section 1 discriminates
30 format designating data, repetition data, and ordinary printing data or variable data, out of an input signal applied from a host computer, and causes

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a repetition data memory 3 and a variable data buffer 4 to store the repetition data and the variable data, respectively. Each of the repetition data memory 3 and the variable data buffer 4 has the capacity for storing a page or document. Data corresponding to one line on the document are successively read out of the respective memories 2, 3 and 4.

The format memory 2 stores in advance plural kinds of formats F1, F2,.... The designated format data read out of the format memory 2 is converted into a format pattern by a form pattern generator 5 and the form pattern is temporarily stored in a form pattern buffer 6.

A character code read out of the repetition data memory 3 is converted into a printing pattern by a printing pattern generator 7 and ORed with the form pattern in the form pattern buffer 6. Another character code read out of the variable data buffer 4 is converted into another printing pattern by the printing pattern generator 7 and is temporarily stored in a printing pattern buffer 8. The outputs of the respective pattern buffers 6 and 8 are ORed with each other by an output buffer 9 to form a drive signal which is then applied to a head driver 10. On the basis of the drive signal, the head driver 10 drives a printer head 11.

After the format designating data, F1, and the repetition data, R1, have been inputted into the above-mentioned printing apparatus from a host computer, only variable data X1, X2,...., Xn, are inputted, as shown in Figure 2. The variable data are combined with the format data, F1, and the

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repetition data, R1, which have been respectively stored in the format memory 2 and the repetition data memory 3, to constitute a document and the contents thereof (F1, R1, X1), (F1, R1, X2), ..., (F1, R1, Xn), as shown in the right hand side of Figure 2 are printed on the documents to reproduce the variable and repetitive contents.

Upon completion of printing a predetermined number of documents, that is n, the repetition data memory 3 is cleared. When the repetition data, R2, is then inputted, the repetition data memory 3 stores the new repetition data, R2, while the format designating data, F1, is left as it was because the form data, F1, has not been changed in this example. Then the variable data Y1, Y2, ... are inputted so that the documents having form, repetition, and variable data, (F1, R2, Y1), (F1, R2, Y2), ... are successively printed every time the variable data are inputted for a document.

Although a thermosensitive line dot printer is used in this embodiment, the present invention can be achieved by using any type of recording system, such as electrostatic, ink jet, electrophotographic, electro-discharge, electrolytic, magnetic, etc., and any type of head structure, such as a line dot system, a dot matrix system, etc.

According to the present invention, as described above, in a form overlay type document printing apparatus in which a printing data buffer and a form buffer are provided separately so that only printing data are transferred from a host computer unless form data are changed, printing data

for one document is divided into a part which is repeated without changing over a plurality of documents and a part which changes with every document so that only the variable data are transferred from the host computer unless the repetition data are changed. The respective data corresponding to every line of a document are read out of a format memory, a repetition memory, and a variable data buffer and are converted into printing patterns. The patterns are combined and outputted to the printing apparatus. Thus, in comparison with the conventional overlay type document printing apparatus, in which all the printing data other than the format data are transferred for every page, the printing apparatus of the present invention has an advantage that the amount of data to be transferred is reduced so that not only the transferring time is reduced but the processing by the computer can be simplified.

While the salient features of the invention have been described with reference to the drawings, it should be understood that the described embodiment is susceptible of modification without departing from the spirit and scope of the following claims.

CLAIMS:

1. A form overlay type document printing apparatus for receiving form data, repetition data, and variable data from a host computer and for producing a printed output corresponding thereto, characterized by the apparatus comprising:
- a format memory (2);
 - a repetition data memory (3);
 - a variable data buffer (4);
 - input data means (1) for supplying form data, repetition data, and variable data received from the host computer to said format memory (2), said repetition data memory (3), and said variable data buffer (4), respectively,
 - a form pattern generator (5) for generating form printing signals corresponding to said format data stored in said format memory (2);
 - a printing pattern generator (7) for generating repetition printing signals corresponding to said repetition data and variable printing signals corresponding to said variable data;
 - a form pattern buffer (6) for combining said form printing signals and said repetition printing signals to output a selected sequence of combined printing signals for a succession of documents; and
 - an output buffer (9) for combining said combined printing signals with said variable printing signals to produce corresponding print driver signals for each document in said succession of documents.
2. A form overlay type document printing apparatus according to claim 1, characterized by a printer head (11); and

a head driver circuit (10) for controlling said printer head (11) to generate printed material corresponding to said print driver signals.

5 3. A form overlay type document printing apparatus according to claim 2, characterized in that said printer head (11) comprises a dot matrix print head.

10 4. A form overlay type document printing apparatus, characterized by comprising:

a printing data memory (4, 3) for storing variable printing data which is unique to each document to be printed and repetition printing data which is common to each document within a first succession of documents to be printed;

15 a format data memory (2) for storing format printing data defining a form to be printed on each document within a second succession of documents to be printed, said second succession of documents including said first succession of documents;

20 means (6, 8, 9) for combining said format printing data, said repetition printing data, and said variable printing data to produce print control signals corresponding to said format data, said repetition data and said variable data for each document to be printed;

25 means (10, 11) for producing printed documents corresponding to said print control signals; and

30 means for transferring to said printing data memory (4, 3) said variable printing data prior to the printing of each document and said repetition printing data prior to the printing of the first document in said first succession of documents and to said format data memory (2) said format printing data prior to the printing of the first document in said succession of documents.

5. A form overlay type printing apparatus according to claim 4, characterized in that said printing data memory comprises a variable data buffer (4) for storing said variable printing data and a repetition data memory (3) for storing said repetition printing data.

6. A form overlay type printing apparatus according to claim 5, characterized in that said combining means comprises:

10 a printing pattern buffer (8) for receiving and storing said variable printing data;

a form pattern buffer (6) for receiving, combining, and storing said format printing data and said repetition printing data; and

15 an output buffer (9) for receiving, combining, and storing the contents of said printing pattern buffer (8) and said form pattern buffer (6).

7. A form overlay type printing apparatus according to claim 6, characterized in that said transferring means comprises an input control section (1) connected to said format memory (2), said repetition data memory (3), and said variable data buffer (4) and adapted to be connected to a host computer for the receipt of said variable printing data, said repetition printing data, and said format printing data therefrom.

8. A form overlay data printing apparatus according to claim 7, characterized in that said producing means comprises:

30 a print head (11); and

a print head driver (10) for controlling the operation of said print head (11) in accordance with said print control signals.

FIG. 1

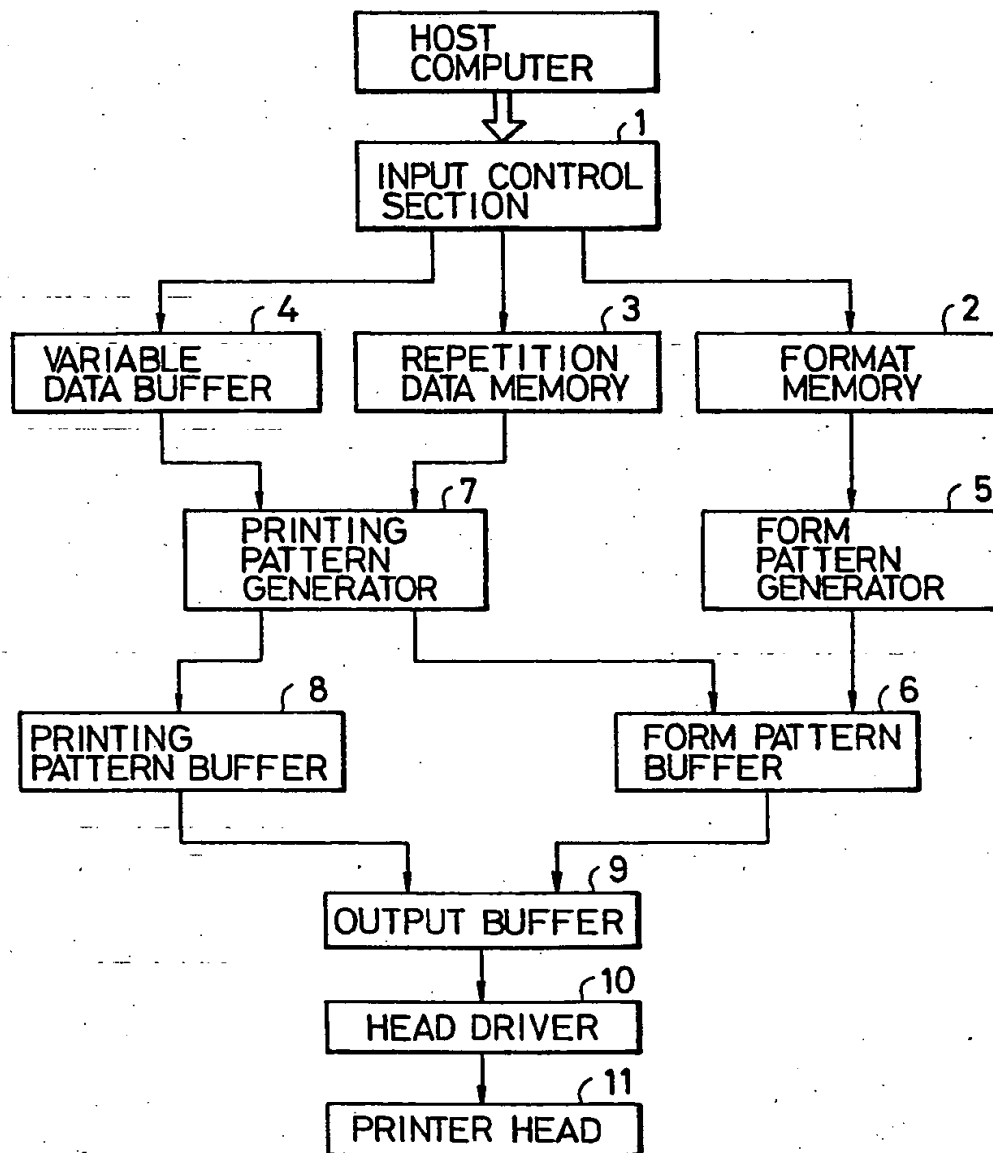


FIG. 2

